DEVARAJ KUSUGAL

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# SUMMARY

* Overall, 4 years of experience in automotive CFD
* Experienced in building CFD models for commercial and passenger full vehicle using ANSA
* Preparing case setup for Aero and thermal simulation in Labs, Ansys Fluent and Star CCM+
* Knowledge in T-Grid
* Knowledge in Python Scripting for ANSA
* Knowledge of CAD tools NX-cad and CATIA
* Knowledge in CFD and FE concepts

**Tools known**

**ANSA, Labs, STAR CCM+ ,Ansys Fluent, TAItherm, Meta**

## EDUCATION

Bapuji Institute of Engineering and Technology, Davangere, Karnataka

B.E. in Mechanical Engineering - June 2016

Aggregate: 70.56%

Karnataka Education Board

Pre-University - April 2012

Score: 81%

## EXPERIENCE

**Applus Idiada Automotive India pvt ltd (client PSA) - Automotive CAE-CFD Engineer (March 2020-Now)**

A member of CFD (Computational Fluid Dynamics) team, working on automotive components to build FE (Finite Elements) models as per the quality criteria of PSA (Stellantis).

**Contributions:** Contributed to multiple projects of PSA commercial and non-commercial vehicles

* Understand the requirement of client, preparing query sheet and clarifying document.
* Generating volume in Ansys T-grid and clearing points.
* Preparing case setup for Simulation in Ansys Fluent and for **Thermal and Aero full-vehicle models.**Preparing proper model for thermal coupling.
* Preparing model for TAItherm for coupling purpose.  
  creating Fluid nodes, multi-layer and assigning proper material and temperature and heat transfer-coefficient etc.
* Modeling wise-Understand the irregularities of CAD and Primary Geometry clean-up
* Building FE models as per requirements of automotive components
* Building **Thermal, Aero and flow** Models and **Sub-Assemblies** and Full vehicle integration ANSA as per PSA guidelines
* Generate CFD model and perform quality checks as per the standard of PSA
* Creating Check-list documents and reports for the simulations.
* Using meta and enSight for the post-process

**Renault Nissan through Expleo (Assystem Technologies) - Automotive CAE-CFD Engineer (August 2018-March 2020)**

A member of CFD (Computational Fluid Dynamics) team, working on automotive components to build FE (Finite Elements) models as per the quality criteria of RNTBCI (Renault Nissan technology business center India).

**Contributions:** Contributed to multiple projects of Renault Nissan commercial and noncommercial vehicles

* Understand the requirement of client, preparing query sheet and clarifying document.
* Preparing case setup for Simulation in LABS for **Thermal and Aero full-vehicle models**
* Helping to create pre-processing documents
* Modeling wise-Understand the irregularities of CAD and Primary Geometry clean-up
* Building FE models as per requirements of automotive components
* Building **Thermal, Aero and Power flow** Models and **Sub-Assemblies** and Full vehicle integration ANSA as per Renault Nissan guidelines
* Generate CFD model and perform quality checks as per the standard of Renault Nissan
* Experience in VR model creation for the aero simulation

## PROJECT

**Development of FE Model and simulating Full vehicle**

**Projects:**

* Full vehicle modal building for under hood thermal management, Air flow and Radio frequency, Brake cooling for passenger and commercial Vehicles.
* Case setup for external Aerodynamics (CdA, Cooling ,Hood Retention , Snow injection )and under hood thermal management

**Tools used : ANSA, Labs, STAR CCM+ Ansys Fluent TAItherm,Meta and EnSight**

1. **Under hood thermal management and Under hood airflow**

* Once the full vehicle modeling is done using ANSA, basic checks like qualities, unchecked faces, duplicate elements, proximities and user thickness must be cleared.
* Export full vehicle FE model for fluent in msh file format.

**CASE SETUP**

* Importing msh file to fluent in meshing mode
* Creating volume using tet with specified growth rate
* Scaling the model and assigning the material thickness, thermal conductivity, material for all the components in the model.
* Modeling heat exchangers (Radiator, condenser and Intercooler) means specifying the size, and properties of the primary and auxiliary fluids using provided data from JGB
* Specifying the boundary conditions for tunnel and interior parts (porous parts)
* Preparing model TAItherm for coupling purpose.  
  creating Fluid nodes ,multi-layer and assigning proper material and temperature and heat transfer-coefficient

**POST-PROCESSING**

* For specified iterations analyzing the key areas like high pressure, high temperature and high velocity with detailed contour vectors and streamlines.
* Preparing post processing documents.
* Giving counter measure for the encountered problems in simulation ex: catalytic convertor sensor was failing due to high temperature of exhaust line due to convection and radiation so suggested to add heat sheet between catalytic converter and sensor.

1. **External aerodynamics (CDA case, Hood Retention)**

* Similar for Aerodynamics once the full vehicle modeling is done using ANSA, basic checks like qualities, unchecked faces, duplicate elements, proximities and user thickness has to be cleared.
* Creating rotating domains
* Case setup for CdA and Hood retention is similar
* Export full vehicle FE model for fluent in msh file format.

**CASE SETUP**

* Case setup is similar to the thermal but material and component thickness no need to specify
* For more hex-core mesh will created using fluent meshing mode
* MRF (Moving reference Frame) modeling and specifying no of rotations (RPM), directions
* Simulating for different vehicle speed condition
* Specifying the boundary conditions for tunnel and interior parts(porous parts) and rotating domains

**POST-PROCESSING**

* For specified iterations computing the CdA value.
* Calculating pressure and cool-pack drag in hood region.
* Preparing post processing documents.
* Giving counter measure for the encountered problems in simulation ex: In one we encountered more drag than usual due to unexpected wake region in underbody so suggested to add air dams and under body closures

**General Motors through Creative Synergies Group - Automotive CAE Engineer**

**(Jan 2017-May 2018)**

A member of CFD (Computational Fluid Dynamics) team, working on automotive components to build FE (Finite Elements) models as per the quality criteria of GM (General Motors).

**Contributions:** Contributed to multiple projects of GM commercial and noncommercial vehicles.

* Understand the irregularities of CAD and Primary Geometry clean-up
* Building FE models as per requirements of automotive components
* Building **CFD Thermal and Powerflow** Model and **Sub-Assemblies** in ANSA as per client guidelines
* Worked on Subsidiaries of General Motors like: **CADILLAC, OPEL, GMC and CHEVEROLET** commercial and non-commercial vehicles
* Create and validate the CFD model in respect of surface mesh and volume generation.
* Generate CFD model and perform quality checks as per the standard
* Knowledge on Automotive Components, Powertrain & Electric Powertrain Strong knowledge in FEA concepts and techniques
* Building FE model of Exhaust, Engine, and Chassis components

## PROJECT

**Development of FE Model for Different components of Automotive System**

* In chassis mainly brakes, suspension, mounts, steering, wheels and chassis structure are modelled according to different quality criteria (Quality criteria mainly involves global length, skewness, proximity and penetrations) of GM
* In Renault Nissan global length, skewness, aspect raio, minimum and maximum angle ,wrapage ,minimum and maximum length etc.
* Building FE models of powertarin integration, powertrain, structure of full vehicle involving - exhaust system, air induction system, fuel system, driveline system, engine block, CRFM, radiator tank, exterior and structure of full vehicle is built as per the GM and Renault Nissan guidelines.
* Assembly and sub-assemblies of full vehicle are made with different volumes as per the guidelines. Volume checks and quality checks are done by T-Grid in Fluent for each assembly and Sub-assemblies full vehicle
* Preparing case setup for Simulation in Ansys Fluent and Star CCM+ for **Thermal and Aero full-vehicle models**

**ACADEMIC PROJECT**

Topic: **Dry Sliding wear behavior of In-situ Mg-Al/Mg2-Si Composite material.**

Objective:

* To develop the MMC’s with different composition of particulate using liquid stir casting technique.
* To investigate the wear parameter like load, speed and distances on dry sliding wear test.

Applications:

* Used for vertical section of advanced fighter aircraft.
* Used in the mass structure in the Hubble telescope.

## INTERNSHIP

Internship in **JSW Steel Ltd**. Toranagallu, Bellary

* Learned the process extraction of iron from base ore and different blast furnaces during its process, extraction of steel from iron for different levels of standards
* Preparing steel bars, thin steel sheets for different client standards.

## ACHIEVEMENT

Model Excellence award in Creative Synergies Group ( April 2017)

Best Performer award in Expleo technologies

Devaraj Kusugal